

REMARKS

Favorable reconsideration of this application, in light of the following discussion and in view of the present amendment, is respectfully requested.

Claims 1 and 3 have been amended. Claims 5 and 12 have been cancelled. Claim 13 had been added. Claims 1-4, 6-11 and 13 are pending and under consideration.

I. Rejections under 35 U.S.C. § 112

In the Office Action, at page 2, numbered paragraphs 2-3, claims 4-7 were rejected under the second paragraph of 35 U.S.C. § 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the recitations “negative-type” and “positive-type” were deemed indefinite. It is respectfully submitted that the terms “positive-type photosensitive material” and “negative-type photosensitive material” are well known in the art of semiconductors. The Examiner’s attention is directed toward the Abstracts of U.S. Patent Nos. 6,806,032, 6,699,646, 6,025,461, 7,067,236, 5,181,984, 5,223,083, 6,979,588, and 6,916,594, each of which use the same or similar type wording for describing materials related to the art of semiconductors. Claim 5 has been cancelled. Accordingly, withdrawal of these § 112 rejections is respectfully requested.

II. Rejections under 35 U.S.C. § 102

In the Office Action, at pages 2-3, numbered paragraphs 4-5, claims 1-3, 10 and 12 were rejected under 35 U.S.C. § 102(b) as being anticipated by JP 08-279478.

JP 08-279478 does not discuss or suggest “exposing the photosensitive resist layer by irradiating it with a radiation capable of penetrating the wafer, at the side having the electronic circuits formed, and along the dicing lines for subsequently cutting the wafer for the dicing” or “wherein the radiation irradiating the photosensitive resist layer is at least one of X-ray and infrared ray radiation,” as recited in amended claim 1. In other words, the exposing of the photosensitive resist layer on the backside of a wafer is accomplished by *indirectly irradiating* it with at least one of *X-ray and infrared radiation at the side of the wafer having the electronic circuits formed thereon*. In contrast, the undersigned has been informed that paragraphs [0020] through [0024] of JP 08-279478 disclose that JP 08-279478 is directed toward irradiating a photoresist on the backside of a wafer with radiation *directly at the backside*, not through the side having the electronic circuits formed thereon. Furthermore, JP 08-279478 makes no mention of using X-ray or infrared radiation in the exposing. Specifically, JP 08-279478 reads as follows:

[0020] A process of backside resist spreading is then carried out. In this process, semiconductor wafer 1 is reversed, and the backside of the wafer is coated with a photosensitive resist 20 by spin coating, as shown in Fig. 1(b). The right side of the semiconductor wafer 1 has dicing lines 21 previously formed.

[0021] An exposure/development process is then carried out. In this process, a mask 22 is arranged at the backside of the semiconductor wafer 1 on which the photosensitive resist 20 was applied, as shown in Fig. 1(c).

[0022] Mask 22 has a pattern of lines which corresponds to that of the dicing lines 21 at the right side of the semiconductor wafer 1, each of the lines having a width of the order of 100 micrometers and larger than that of the dicing line 21. Mask 22 is arranged such that the line pattern of the mask is aligned with that of the dicing lines 21.

[0023] After the alignment of mask 22 with the wafer, photosensitive resist 20 is irradiated with light from an exposure source through mask 22, whereby the parts of the photosensitive resist 20 corresponding to the dicing lines 21, at the backside of the semiconductor wafer 1, are exposed to have a width of the order of 100 micrometers.

[0024] An etching process is then carried out. In this process, the semiconductor wafer having been subjected to the exposure/development treatment of the resist 20 is etched, as shown in Fig. 1(d). By this etching process, backside dicing lines 23 of about 100 micrometers wide and about 10 micrometers deep are formed on the backside of the semiconductor wafer 1.

Since JP 08-279478 does not discuss or suggest "exposing the photosensitive resist layer by irradiating it with a radiation capable of penetrating the wafer, at the side having the electronic circuits formed, and along the dicing lines for subsequently cutting the wafer for the dicing" or "wherein the radiation irradiating the photosensitive resist layer is at least one of X-ray and infrared ray radiation," as recited in claim 1, claim 1 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

Claims 2-3, and 10 depend either directly or indirectly from claim 1, and include all the features of claim 1, plus additional features that are not discussed or suggested by the reference relied upon. Therefore, claims 2-3, and 10 patentably distinguish over the reference relied upon for at least the reasons noted above. Accordingly, withdrawal of these § 102(b) rejections is respectfully requested.

Claim 12 has been cancelled. Accordingly, withdrawal of this § 102(b) rejection is respectfully requested.

In the Office Action, at page 3, numbered paragraph 6, claims 1-3 and 12 were rejected under 35 U.S.C. § 102(e) as being anticipated by Lebens (U.S. Patent No. 6,521,513).

Lebens does not discuss or suggest “exposing the photosensitive resist layer by irradiating it with a radiation capable of penetrating the wafer, at the side having the electronic circuits formed, and along the dicing lines for subsequently cutting the wafer for the dicing” or “wherein the radiation irradiating the photosensitive resist layer is at least one of X-ray and infrared ray radiation,” as recited in claim 1. In other words, the exposing of the photosensitive resist layer is accomplished by *indirectly irradiating* it with at least one of *X-ray and infrared radiation* at the side of the wafer having the electronic circuits formed thereon. By indirectly irradiating the photosensitive resist layer with at least one of X-ray and infrared radiation through the backside of the wafer along the dicing lines, the invention of claim 1 provides for the transmission of an opaque silicon substrate. Lebens, as relied on by the Examiner, merely provides a method whereby the backside of the semiconductor wafer is *lithographically* patterned with a pattern aligned to the streets defined on the front side. (Lebens, col. 3, lines 14-17). Lebens makes no mention of using radiation in exposing the photoresist layer indirectly through the backside of the wafer.

Since Lebens does not discuss or suggest “exposing the photosensitive resist layer by irradiating it with a radiation capable of penetrating the wafer, at the side having the electronic circuits formed, and along the dicing lines for subsequently cutting the wafer for the dicing” or “wherein the radiation irradiating the photosensitive resist layer is at least one of X-ray and infrared ray radiation,” as recited in claim 1, claim 1 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(e) rejection is respectfully requested.

Claims 2-3 depend either directly or indirectly from claim 1, and include all the features of claim 1, plus additional features that are not discussed or suggested by the reference relied upon. Therefore, claims 2-3 patentably distinguish over the reference relied upon for at least the reasons noted above. Accordingly, withdrawal of these § 102(e) rejections is respectfully requested.

Claim 12 has been cancelled. Accordingly, withdrawal of this § 102(e) rejection is respectfully requested.

III. Rejections under 35 U.S.C. § 103

In the Office Action, at page 4, numbered paragraphs 7-8, claims 4-11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lebens.

As discussed above, Lebens does not discuss or suggest all of the features of claim 1. Specifically, Lebens does not discuss or suggest “exposing the photosensitive resist layer by

irradiating it with a radiation capable of penetrating the wafer, at the side having the electronic circuits formed, and along the dicing lines for subsequently cutting the wafer for the dicing” or “wherein the radiation irradiating the photosensitive resist layer is at least one of X-ray and infrared ray radiation,” as recited in claim 1. Therefore, claim 1 patentably distinguishes over the reference relied upon.

Claims 4 and 6-11 depend either directly or indirectly from claim 1, and include all the features of claim 1, plus additional features that are not discussed or suggested by the reference relied upon. Therefore, claims 4 and 6-11 patentably distinguish over the reference relied upon for at least the reasons noted above. Claim 5 has been cancelled. Accordingly, withdrawal of these § 103(a) rejections is respectfully requested.

IV. New Claim

New claim 13 has been added. None of the prior art cited by the Examiner discusses or suggests “exposing the photosensitive resist layer by irradiating it with a radiation capable of penetrating the wafer, at the side having the electronic circuits formed, and along dicing lines for subsequently cutting the wafer for the dicing,” as recited in new claim 13. Therefore, new claim 13 patentably distinguishes over the references relied upon. Thus, it is submitted that new claim 13 is in a condition suitable for allowance.

CONCLUSION

Claims 1 and 3 have been amended. Claims 5 and 12 have been cancelled. Claim 13 has been added. Claims 1-4, 6-11 and 13 are pending and under consideration.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

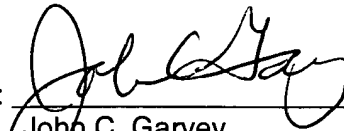
Serial No. 10/757,498

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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